

Applicant(s): RICHARD E. FORKEY ET AL.
Serial No.: 10/809,198
Filed: March 25, 2004

In the Claims

Please amend claims 1 through 5, 7 through 12 and 14 through 19.
1 (Currently amended). An optical device characterized by an axis and comprising:

- A) an optical element ~~located~~ on the axis including first and second faces and an intermediate peripheral surface, and
- B) optical element support means extending along the axis for defining a positive seat for said optical element, said support means including:
 - i) ~~a first support means portion at an~~ intermediate axial location of said support means that engages for engaging said optical element peripheral surface, and
 - ii) ~~second support means integral portions in~~ portions of said optical element support means adjacent opposite ends of said first portion for engaging each of said first and second faces adjacent said peripheral surface whereby said first and second support means portions lock said optical element at the intermediate location in said optical device to and limit motion of said optical element along the axis.

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2 (currently amended). An optical device as recited in claim
1 wherein said first ~~support means portion~~ conforms to the
geometry of said peripheral surface and said second ~~support~~
~~means~~ portions conform to adjacent portions of said first and
second faces.

3 (Currently amended). An optical device as recited in claim
2 wherein said first ~~support means portion~~ includes an
intermediate portion of a housing means for engaging said
peripheral surface and said second ~~support means including~~
portions include spaced crimped portions of said housing means
for conforming said housing means to the geometry of said first
and second faces adjacent said peripheral surface.

4 (currently amended). An optical device as recited in claim
2 wherein said ~~support means first portion~~ includes an
intermediate portion of a housing means for engaging said
peripheral surface, and said second portions being constituted
by said housing means having first and second deformed portions
for conforming said housing that conform to the geometry of
said first and second faces adjacent to and about said
peripheral surface.

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5 (Currently amended). An optical device as recited in claim 2 wherein ~~each of~~ said support means includes first and second axially extending shells, each said shell having an ~~intermediate a said first~~ portion for engaging said peripheral surface, and having second plastically deformed transitions ~~oppositely extending portions that overlie overlying~~ said first and second faces adjacent said peripheral surface ~~and plastically deformed transition portions between said intermediate portion and each of said oppositely extending portions that conform to the geometry of said first and second faces adjacent said peripheral surface.~~

6 (original). An optical device as recited in claim 5 including means for capturing said first and second shells.

7 (Currently amended). An optical device characterized by an axis and comprising:

- A) a lens set comprising at least one lens element located on the axis, said lens set including first and second faces and an intermediate peripheral surface, and
- B) lens set support means for defining a positive seat for said lens set, said support means including first support portion means for engaging said peripheral

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surface and second plastically deformed ~~support~~
portion means for engaging each of said first and
second faces adjacent said peripheral surface whereby
said lens set is locked in said optical device to
limit motion along the axis.

8 (Currently amended). An optical device as recited in claim
7 wherein said first ~~support means~~ portion means conforms to
the geometry of said lens set peripheral surface and said
~~support~~ second portion means conform to adjacent portions of
said first and second faces.

9 (Currently amended). An optical device as recited in claim
8 wherein said lens set peripheral surface is cylindrical and
~~portions of said first support means~~ portions means that are
coextensive with said peripheral surface engage said peripheral
surface.

10 (Currently amended). An optical device as recited in claim
9 wherein said first ~~support means~~ portion means includes an
intermediate portion of a cylindrical housing for engaging said
peripheral surface and each of said ~~second support portion~~
means includes angularly spaced crimps of said housing that

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overlie portions of said first and second faces adjacent said peripheral surface.

11 (Currently amended). An optical device as recited in claim 9 wherein said first ~~support means~~ portion means includes an intermediate portion of a cylindrical housing for engaging said lens set peripheral surface and each of said second ~~support~~ portion means includes plastically deformed circumferentially extending portions of said housing that conform said housing to the geometry of said first and second faces adjacent to and about said peripheral surface.

12 (Currently amended). An optical device as recited in claim 9 wherein said lens set support means includes first and second axially extending shells each having an intermediate first portion means of a first radius for engaging said lens set peripheral surface and second portion means include ~~r~~ oppositely extending portions having a second radius less than the first radius thereby to overlie said first and second faces adjacent said peripheral surface and plastically deformed transition portions between said intermediate portion and each of said oppositely extending portions that conform to the geometry of said first and second faces adjacent said peripheral surface wherein each of said first and second

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~~support means shells~~ includes said ~~intermediate and transition portions~~ first and second portion means.

13 (original). An optical device as recited in claim 12 including an outer housing for capturing said first and second shells.

14 (Currently amended). An endoscope comprising a plurality of optical elements formed as optical modules, each of said optical modules comprising:

- A) a set of at least one optical element taken from the group of lenses, spacers, windows and prisms located on an axis, said optical element set including first and second faces and an intermediate peripheral surface, and
- B) optical element support means extending along the axis for defining a positive seat for said optical element set, said support means including first ~~support-portion~~ means for engaging said optical element set intermediate peripheral surface and second plastically deformed ~~support-portion~~ means for engaging said first and second optical element set faces adjacent said peripheral surface whereby said

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optical element is locked in said optical module to
limit motion along the axis.

15 (Currently amended). An endoscope as recited in claim 14 wherein said first ~~support means~~ portion means conforms to the geometry of said optical element set peripheral surface and each of said second ~~support means~~ portion means ~~conform~~ conforms to an adjacent ~~portions~~ portion of said first and second optical element set faces.

16 (Currently amended). An endoscope as recited in claim 15 wherein said optical element set peripheral surface is cylindrical and portions of said first ~~support means~~ portion means that are coextensive with said peripheral surface engage said peripheral surface.

17 (Currently amended). An endoscope as recited in claim 16 wherein said first ~~support means~~ portion means includes an intermediate portion of a cylindrical housing for engaging said optical element set peripheral surface and each of said second ~~support~~ portion means includes angularly spaced crimps of said housing that overlie portions of said first and second optical element set faces adjacent said optical element set peripheral surface.

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18 (Currently amended). An endoscope as recited in claim 16 wherein first ~~support means~~ portion means includes an intermediate portion of a cylindrical housing for engaging said optical element set peripheral surface and each of ~~—~~ said second ~~support means~~ portion means includes plastically deformed circumferentially extending portions of said housing for conforming said housing to the geometry of said first and second optical element set faces adjacent to and about said optical element set peripheral surface.

19 (Currently amended). An endoscope as recited in claim 16 wherein said optical element support means includes first and second axially extending shells each having ~~an intermediate portion~~ a first portion means of a first radius for engaging said optical element set peripheral surface ~~—~~ and second portion means formed in oppositely extending portions ~~having of said shells with~~ a second radius less than the first radius ~~thereby to overlie~~ whereby said second portion means overlie said first and second faces adjacent said optical element set peripheral surface and wherein each of said second portion means includes plastically deformed ~~transition portions~~ transitions between said ~~intermediate portion~~ first portion means and each of said oppositely extending portions that conform to the geometry of

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said first and second optical element set faces adjacent said optical element set peripheral surface wherein each of said first and second ~~support means~~ shells includes said ~~intermediate and transition~~ first and second portions.

20 (original). An endoscope as recited in claim 19 including an outer housing for capturing said first and second shells.

21 (Previously presented). An endoscope comprising a cylindrical sheath, objective lens means at a distal end for forming an image, relay lens means for transferring the image from said objective lens means toward a proximal end and eyepiece means at said proximal end for providing the image for viewing wherein at least one of said objective lens means, relay lens means and eyepiece means comprises an optical module for being located within the sheath and wherein each said optical module comprises:

- A) a lens set of at least one lens element for directing the image along an axis, said lens set being characterized by a lens set cylindrical peripheral surface and two lens set faces oriented transversely to the axis,
- B) a support means extending along the axis having a first support portion for engaging said lens set

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cylindrical peripheral surface and second support portions extending from said first support portion that include plastically deformed sections that conform to said lens set faces adjacent said lens set peripheral surface whereby said second support portions lock said lens set to limit axial motion thereof.